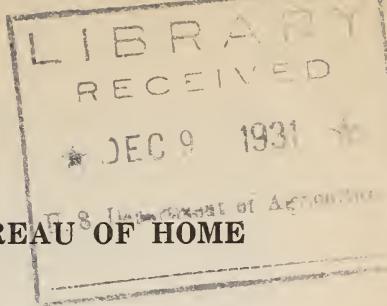


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REPORT OF THE CHIEF OF THE BUREAU OF HOME ECONOMICS

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF HOME ECONOMICS,
Washington, D. C., August 31, 1931.

SIR: I present herewith the report of the Bureau of Home Economics for the fiscal year ended June 30, 1931.

Respectfully,

LOUISE STANLEY, *Chief.*

Hon. ARTHUR M. HYDE,
Secretary of Agriculture.

The work of the Bureau of Home Economics during the past year has been adjusted as far as possible to meet the needs of homes with incomes reduced by the drought and unemployment. This has called for the personal services of the chief and various members of the bureau staff on special committees, has led to the undertaking of new projects, and has given special direction to much of the regular work of the bureau, carried on through its divisions of foods and nutrition, textiles and clothing, and economics. These widening activities have in turn increased the demands upon the administrative and information offices, where the resulting correspondence and requests for advice or service have been partly met by specialized output and specialized distribution of the bureau's publications.

EMERGENCY SERVICES

In the early fall, as a result of the reports from the nutrition workers in the drought States, a nutrition committee was formed as a subcommittee of the emergency drought relief committee. This was made up of representatives of the Extension Service, Red Cross, Public Health Service, Office of Education, and three members of this bureau. As its contribution to the work of the subcommittee this bureau made special studies in low-cost diets, prepared low-cost food guides for use of workers in the drought areas, and issued and distributed many thousands of leaflets.

On account of the fear that the economic situation would be reflected in an increased occurrence of pellagra and other evidences of malnutrition, especially in the drought sections of the South, special attention was given to this aspect of the problem. The results of previous studies on pellagra were summarized, and additional studies were made to increase our knowledge of cheap sources of the "protective foods" as well as those containing the pellagra-preventive factor. This information has been made available from time to time in mimeographed reports and news releases.

In the early winter the woman's division of the President's Emergency Committee on Employment asked that the nutrition service be extended to families with incomes reduced because of unemployment, and to workers with families receiving special aid. The earlier publications were therefore revised, and a series of weekly news releases entitled "The Market Basket" were prepared for the press service, beginning January 9, 1931. It is planned to continue this service, adapting it to meet any special needs that may arise.

Various social agencies have requested information on family budgets. A summary has been made of budgets in use in different sections of the country, and a selected group of these has been mimeographed for distribution. Arrangements have been made for a cooperative study on family budgets to be undertaken with the family committee of the National Conference on Social Work.

WHITE HOUSE CONFERENCE ON CHILD HEALTH AND PROTECTION

During the fall considerable time was given by various members of the staff to the completion of the reports of the White House Conference on Child Health and Protection and to the preparation and presentation of material based on these reports. Members from every division of the bureau, as well as the home economics representatives of the Extension Service, have made a contribution to the final reports of this conference. The reports of the committee on the family and parent education will make up eight volumes of the final report.

PRESIDENT'S CONFERENCE ON HOME BUILDING AND HOME OWNERSHIP

I have been asked to serve as a member of the planning committee of the President's Conference on Home Building and Home Ownership, and am serving on two of the subject-matter subcommittees of this conference. The work of five subcommittees of this conference—home making, household management, kitchens and work spaces, house furnishing, and fundamental equipment—relates very closely to the work of this bureau, and as far as possible the bureau's services are being placed at their disposal. Some of the bureau staff are serving as members of the subcommittee, and Laura C. Brossard, assistant economist in the bureau, is serving as secretary and technical assistant to the conference committee on household management. The amount of factual data on housing and equipment available in form for the use of the home maker is small, and the information collected by this conference should be of great value in bettering conditions of housing and home living. A bibliography on household management has been prepared, and one on kitchens is in preparation. The bibliography on household refrigeration, previously issued, is being brought up to date for the use of the committee on fundamental equipment.

FOODS AND NUTRITION

In the foods and nutrition division the work is continuing under three heads: (1) Food composition, (2) nutrition studies, and (3) food utilization. The work on food utilization has been very much

strengthened by the appointment of Florence B. King, formerly with Iowa State College, in charge of this section.

FOOD COMPOSITION

Studies of the composition of American foods constitute a continuing project of the bureau, the results being published from time to time as they become available. Results of the study of fresh vegetables were published last January. Since then the work has been directed to other classes of foods, and first steps have been taken toward an intensive study that will review and evaluate all the available data on the proximate composition of fresh meats and several types of fruit and vegetable products.

The wide distribution of the food-composition tables already published by the bureau has given rise to an increased demand from persons interested in foods and nutrition for information on the composition of foods not yet reviewed. This has necessitated extending the service performed by the bureau in the past, that of directing workers in related fields to source material.

During the year this section also assisted in the preparation of a manuscript on meals for preschool children, containing data on the chemical composition of cooked foods. This work was done in cooperation with the Merrill-Palmer School in Detroit and is intended for use in nursery schools and other institutions that plan and prepare meals for children between 2 and 6 years of age. Standards of adequacy are presented, together with suitable menus and recipes for preschool children. This is an especially important contribution, because so little accurate information is available on the composition of cooked foods. The cooperation of the food utilization section was had in checking weights, proper time of cooking, and recipes.

Because of the increased emphasis at present on the nutritive value of the mineral constituents of food, numerous requests come to us for this information. A card file of references to mineral content of food is maintained to answer such requests. It is desirable to extend the work of this section to make possible a more complete collection, evaluation, and summary of these data for publication.

NUTRITION STUDIES

The staff of the nutrition section has worked closely with the food economics unit in the analysis of data obtained from dietary studies among various groups of people and has assisted in the preparation of material on food selection to meet special needs, as already described.

A summary of the information on child feeding, resulting from an experiment at the Washington Child Research Center, has been prepared as a Farmers' Bulletin under the title "Food for Children." This includes suggested menus and recipes. A set of 8 charts, presenting some of the same facts, have been published for groups needing illustrative material.

VITAMIN STUDIES

PELLAGRA PREVENTION

Following up the pellagra study already referred to, assays have been made of vitamins B and G of five samples of wheat germ, one

sample of cottonseed flour, and a composite sample of the brand of yeast used in the laboratory. It was found that wheat germ is as rich in vitamin B as yeast and one-half to one-third as rich in vitamin G. The five samples of wheat germ tested were quite uniform in their content of these factors.

In view of the report of the finding of vitamin G in cottonseed meal, it seemed desirable to test cottonseed flour for this vitamin. A commercial product was selected that had been found to be valuable in other ways as human food and had been on the market for more than 10 years. The tests showed that cottonseed flour is slightly less rich in vitamin G than is wheat germ and is a fair source of vitamin B. In the quantities suggested for use in baked products, it would afford ample amounts of the pellagra-preventive factor for most diets.

At the request of the home demonstration agents of one of the Southern States sugar-cane was tested as a possible source of vitamin B or G. It was found to contain neither in detectable amounts.

The study of banana powder was completed and reported. Later tests showed it to be a more valuable source of vitamin G than reported last year. It contained three-fourths as much vitamin G as the equivalent amount of fresh fruit.

The determination of vitamin G in foods has been retarded in many laboratories because of lack of standardization of methods, and the requirement, in the methods suggested, of a vitamin B extract that is difficult to prepare. Because of this, special attention has been given to the development of a satisfactory method using a more easily prepared basal diet. As a result of these studies the bureau recommends that, in cases where conditions do not permit the purchase or preparation of vitamin B extracts free of vitamin G for use in vitamin G assays, white corn to the extent of 30 per cent of the diet may be used to supply an adequate amount of vitamin B with little addition of vitamin G. This diet can be used successfully in tests for vitamin G, providing all comparisons are relative to the growth rate of the controls on the basal diet only. Workers using this basal diet are cautioned that the animals selected for such comparisons should be of one sex, or that each group should contain the same number of males and females. The test is more sensitive when the rate of gain is about 4 to 5 grams a week.

The work on vitamins B and G is being continued in an effort to determine more exactly the physiological effects of vitamin G with the idea of differentiating it from other still unidentified factors. These studies are well under way and should throw additional light on the relation of vitamin G to pellagra.

VITAMIN ASSAYS

The study of the vitamin content of grapes and grape products was completed. Fresh Thompson Seedless (Sultana) and Malaga grapes were found to be a fair source of vitamins A and B. Thompson seedless grapes contained small amounts of vitamin G, while none was found in the Malaga grapes. Fifteen grams of fresh Thompson seedless grapes contained a sufficient amount of vitamin C to protect guinea pigs against scurvy as determined by the Hojer method. This is approximately the same protection as afforded by

2 cubic centimeters of orange juice. Fifteen grams of Malaga grapes was insufficient to protect them from scurvy.

Two samples of commercial grape juices were studied, one a mixture of juices from Flame Tokay and Zinfandel varieties and the other from Concords. There was no evidence of vitamins A, C, or G in either juice. The juice from the Concord grapes furnished some vitamin B.

The results of this study were reported in a paper read before the medicinal chemistry section of the American Chemical Society in Indianapolis last fall and have been prepared for publication in the Journal of Agricultural Research. The study is being continued to include certain eastern varieties in fresh form. In connection with the above studies the Hojer method for testing for vitamin C was studied and standardized for use in this laboratory.

The study of the vitamin A content of olives was completed, and the results are being summarized for publication. Vitamin A was found in relatively large amounts in both ripe and green olives. No appreciable amounts of vitamins B, G, C, or D were found.

A preliminary study was made of a tuber that closely resembled the ordinary potato in texture and appearance but was deep yellow in color. This tuber contained small but appreciable amounts of vitamin A. The study is to be continued when large amounts of material can be supplied.

FOOD UTILIZATION

MEAT STUDIES

The cooperative study on palatability of meat as affected by different production factors and different methods of cutting, handling, or cooking, has been continued. This study was planned jointly with the Bureaus of Animal Industry and Agricultural Economics. The meat was produced at Federal livestock farms and cooperating State experiment stations. During the year 243 ribs of beef, 448 legs of lamb, 233 pork roasts, and 40 pieces of cured pork have been tested for palatability. Progress has been made in summarizing the results of these studies, and during the past year articles or chapters on the subject have been contributed to the Yearbook of Agriculture, to a bulletin of the Bureau of Animal Industry, and to two outside periodicals.

A study undertaken to determine the relation between the style of cutting 2-rib beef roasts and the time required for cooking the meat showed that for standing ribs the total cooking time is independent of the length of the rib bones. Cutting off several inches of rib bone makes considerable difference in the weight of the roast, however, and the number of minutes per pound required to cook the roast varies with the length of the bone. It is necessary to allow several more minutes per pound at any given oven temperature to cook short rib roasts than for long-boned roasts.

Boned and rolled 2-rib roasts required more total time to cook than is necessary if the rib bones are not removed. On the basis of the time per pound of boned roast, it is found that these roasts require from 10 to 15 minutes per pound more than the average time required for standing roasts.

Two separate studies have been made, one on beef and one on lamb, to determine the effect of aging on palatability. The results of these have not yet been summarized.

In continuation of the studies on the relation of the fell on lamb to palatability and cooking, four pairs of legs were cooked and judged. The results confirmed earlier work done in the bureau, indicating that lamb requires longer to roast and shrinks more when the fell is removed. Further work on this subject is needed before final recommendation can be made.

Cooking experiments have been carried out with cured pork to determine the method and length of time required to cook whole hams, half hams, skinned hams, and boned hams. These data, together with results from cooking tests on other forms of cured pork, have been used in the preparation of a leaflet on cooking cured pork.

CEREAL PRODUCTS

The bureau has for several years recommended the use of wheat germ and rice polish in communities where the diet is likely to be lacking in vitamins B and G, but the tendency of these products to grow rancid under the usual conditions of storage has limited their use. Studies to find a method the home maker might use to retard rancidity were accordingly continued last year. It was found that bitterness became noticeable before the typical odor of rancidity could be detected, and this bitterness increased as rancidity developed. Color tests for rancidity were found not to be dependable, and other chemical tests were little recommended. Bitterness in flavor was therefore used as a criterion of the development of rancidity.

The most satisfactory home method of preserving wheat germ and rice polish was found to be heating the product 8 to 10 minutes in a $\frac{3}{4}$ -inch layer at 375° F. (190° C.). After heating the material was packed in air-tight containers and kept from the light. This finding agrees with the reports made by a number of investigators, that rancidity is caused by an autocatalyzed oxidation which is independent, or almost independent, of enzyme action.

Because corn meal makes up such a large proportion of the diet in sections of the country where pellagra is most prevalent, studies were made of various possible additions to corn meal that would improve its food value and help to correct its deficiency when it makes up a large proportion of a restricted diet. Formulas were worked out for enriching corn meal with dried skim milk or a combination of dried skim milk and wheat germ or rice polish. This mixture supplied adequate amounts of the pellagra-preventive factor, added other essential elements to the diet, and at the same time yielded a very palatable product.

Comparative cooking tests on eight native-grown varieties of rice have been continued, and it has been shown that these rices required different lengths of time for satisfactory cooking. This lends support to the effort to prevent mixing of varieties in the marketing of rice. A score card has been prepared, and these rices have been ranked in accordance with cooking quality. A popular leaflet on rice cooking also has been prepared, and a technical report of the cooking tests is being edited. The rice samples are being held for study of the influence of aging on quality and cooking behavior.

CANNING

In view of the emphasis on canning during the present year, it was deemed advisable to revise and bring up to date the bulletin on home canning of fruits and vegetables. In connection with this some studies were made on the canning of mushrooms in order that this information could be included in the new edition of the bulletin. In bringing together the data for this bulletin, various canned products which had been stored varying periods of time were checked, and the results were added to the data available in the files of this office. All this material has now been brought together as a circular entitled "Summary of Data on Canning Investigations of the Office and the Bureau of Home Economics, United States Department of Agriculture," which has been submitted for publication.

In connection with a revision of Farmers' Bulletin 1186, Pork on the Farm, Killing, Curing, and Canning, by the Bureau of Animal Industry, we were asked to bring up to date the section on canning. For that purpose 946 containers of pork have been canned, and it has been found that the flavor and the texture of the canned meat was equally good whether the meat was packed raw or precooked either in water or by roasting. In general it was found more convenient to pack if precooked in water. The final recommendations as to temperature and time for containers of different sizes are being postponed until bacterial examination and organoleptic tests can be made of this material after storage for a 9-month period.

Similar studies have been made in canning poultry. The initial studies seem to indicate that, as in the case of pork, previous treatment (packing raw or precooking in water or by roasting) has little influence on the flavor of the final product. Containers have been set aside for later examination.

VEGETABLE COOKERY

The study of quality of potatoes, in cooperation with the Bureaus of Plant Industry and Chemistry and Soils, has been continued, the aim being to determine the effect of breeding, fertilization, and storage upon the cooking quality of potatoes. Using the work of the previous year as a basis, the score card has been revised. No summaries or correlations are as yet available, but a preliminary paper was presented before the Potato Growers' Association at Cleveland last December. The practical results of the potato-cooking experiments are being brought together in a leaflet.

To supplement the recommendations sent out for low-cost diets, studies have been made from time to time of various products that were found to be readily available. Since both Pinto and Great Northern beans were abundant in all the markets, recipes for their use were worked out and distributed in mimeographed form. At the request of the Tariff Commission the bureau was asked to study the difference between characteristics of the California Lima bean and the imported Lima bean. The studies showed these varieties to be quite similar in cooking quality, although the imported bean retained its shape when cooked somewhat better than the native bean.

As an introduction to a series of leaflets on cooking vegetables, a circular bringing together the principles of vegetable cookery has

been prepared and is now in press. A beginning has been made in the study of methods of preparation of mushrooms as a basis for a leaflet on this subject. Several new vegetables have been referred to the bureau by the Bureau of Plant Industry, and special work was done on chayotes and bamboo sprouts. The work on chayotes will be included in the vegetable leaflets now in preparation.

The food-utilization section, as usual, has been called upon for considerable service work. Recipes have been tested for the nutrition section, for the bulletins on child nutrition, and the circular on Mid-day Meals for Preschool Children in Day Nurseries and Nursery Schools, for radio work, for the press releases, and The Market Basket. Special recipes were formulated for use in Federal prisons to increase the use of vegetables in prison dietaries.

HOUSEHOLD REFRIGERATION

In connection with the work of the foods and nutrition division, studies on household refrigeration have been continued. These investigations have included studies of the relative efficiency of various grades of household refrigerators, with special emphasis on the development of test methods. The bureau has assisted in the development of the test code which has been approved by the refrigeration subcommittee of the American Standards Association.

During the last year samples of the newer line of refrigerators were studied to compare them with those studied earlier. In general it may be said that the new boxes are more efficient than the majority of those which were available four years ago, but one of the higher-grade boxes which had been in service over a period of four years was retested and found to yield as good results now as when first tested. These tests will be continued from time to time in order to determine the life and duration of efficiency of boxes of different grades.

A comparative study of the relative efficiency of 50 and 100 pound boxes showed the larger box generally more efficient. The boxes were torn down at the conclusion of the test, and the construction was analyzed to determine how the efficiency of the 50-pound box might be increased.

Some of the older boxes which have been in service in the bureau for some time were torn down to discover the point at which the lining showed moisture leakage and absorption of moisture by the insulation. Pictures and full notes were taken of these as the first step in accumulating data on the maintenance of efficiency and durability of boxes.

Studies have been made of the so-called ice fin, a heavy metal device set into the ice compartment to extend the cooling surface. This device has a solid back with extruded or cast fins extending on one side. It increases ice meltage, lowers the temperature in the box, especially in the milk compartment, and makes it possible to maintain the temperature even when the ice cake is much diminished in size. It gives promise of making lower temperatures available by use of ice, and of reducing the frequency of reicing, which in some cases is difficult.

The bacteriological study of meat held at different temperatures was continued. It was shown that the increase in development of

bacteria in samples of meat increased markedly after 50° F., and it is recommended that meat be kept at the same low temperature recommended for milk, 45° F. or below. Studies of development of bacteria in meat give much more irregular results than in milk because the tendency of bacteria to grow in clumps prevents satisfactory sampling, and also because different types of bacteria predominate at different stages of spoilage. On this account an attempt to find the chemical tests which might be used to measure the degree of spoilage proved unsuccessful. These studies need to be continued with special emphasis on the type of bacteria present. The results so far have been summarized in a popular abstract which appeared in the last Yearbook.

ECONOMIC STUDIES

Work has continued during the year on four types of economic studies: (1) Standards of living, (2) food-consumption trends, (3) family budgets and purchasing problems, and (4) housekeeping-efficiency studies. Toward the close of the year members of the staff cooperated in the preliminary work of several committees of the President's Conference on Home Building and Home Ownership, assembling material and outlining problems on the relation of housing to family income and household management. Cooperation was also given in a second national conference on household employment, called by the National Committee on Employer-Employee Relationships in the Home, of which the chief of the bureau and the head of the division are members. Contacts with several national organizations concerned with standard specifications for consumers' goods were maintained by the head of the section on standards of living.

STANDARDS OF LIVING

The investigation of the standards of living of families on marginal farms in the Appalachian highlands, begun in the spring of 1930, has been continued during the year in cooperation with the Bureau of Agricultural Economics and the agricultural experiment stations of Kentucky and Virginia. The field work in the Kentucky study, which was completed in the summer of 1930, covered 230 mountain families in Knott County. Preliminary reports of the findings of this survey were presented at a conference with the extension service of the University of Kentucky and at a meeting of the Kentucky Home Economics Association. The material is now being prepared for publication. A second survey was begun in June in Grayson County, Va., an Appalachian community of a somewhat different type, in cooperation with the Virginia Agricultural Experiment Station.

These Appalachian studies include detailed information as to the expenditures of the families for food, clothing, recreation, and other items, and as to the food and fuel furnished by the farm or obtained from the mountain side. Information is also secured on the kinds of houses occupied and their furnishings and equipment, and on the extent to which spinning, weaving, food preservation,

and other work are carried on in the home. Sanitary conditions and health are being considered, and measurements are being made of the physical and mental development of the children. This information concerning living conditions will be related to the facts obtained by agricultural economists and other cooperators regarding the size and sources of the family income, the type of soil farmed, the use made of the land, and the character of the schools and other community facilities. An understanding of such relationships is essential to the development of programs for the improvement of standards of living in this area.

The division is also cooperating in the preparation of a graphic summary of all of the data now available on the economic and social problems of the southern Appalachian highlands. This material is being prepared jointly by the Bureau of Agricultural Economics, the Forest Service, the Office of Education of the Department of the Interior, the agricultural experiment stations of several States, and this bureau. It will be the responsibility of this bureau to analyze and present existing information on the standards of living prevailing in different parts of the area, and to indicate as far as possible the major factors affecting the adequacy of these standards.

FOOD CONSUMPTION

Studies of the food consumption of various groups of the population have been continued during the year. A report has been prepared of a study of the food supply of 73 marginal farm families in South Carolina among whom pellagra is prevalent. This report gives information regarding the dietary habits of families successful and unsuccessful in warding off the disease and reports the effect upon pellagra incidence of adding definite amounts of certain pellagra-preventing food materials to the diet. On the basis of these facts suggestions are given for improving the diet through a program of home production and conservation of food. This investigation was made cooperatively by the foods and nutrition and the economics divisions of this bureau and the South Carolina State Extension Service, assisted by the State board of health.

Additional information has been gathered, through careful dietary records, of the food consumption of representative farm families. These data are being analyzed in conjunction with similar material gathered in 1926-27 and in the national dietary survey of 1917-18, to show the nutritive value, adequacy, and economy of the diets of these farm groups and to indicate the changes in food consumption that are taking place. Analysis is also being made of the records of food consumption of other types of families included in the 1917-18 dietary survey. This material, collected by the former Office of Home Economics, but for the most part not yet analyzed and presented, covers a large number of rural and city families, including many in the business and professional group. It will furnish an excellent basis from which to measure trends in food consumption.

As an aid in computing the nutritive value of diets, a circular has been prepared on the iron content of common vegetables and fruits. It includes new data for 80 different varieties, forms, or parts of these plant foods, and also some figures taken from the literature. The chemical analyses were made in the laboratories of the depart-

ment of chemistry of Columbia University, and the manuscript has been submitted for publication in cooperation with that department. It will be of particular value to nutrition workers, dietitians, physicians, and others interested in the amount of iron in various American food materials.

FAMILY BUDGETS AND PURCHASING PROBLEMS

During the year the demand for practical material on family budgets and the purchasing problems of the housewife has been greatly intensified by the economic depression and by the drought, and the staff of the division has given as much time as possible to meeting the many requests that have been received. These requests have come from housewives themselves and from extension workers, welfare agencies, and others engaged in helping families to make the most of their resources. The demand for material on planning and purchasing an adequate diet has been especially great, and several publications on the subject have been issued. At the request of the drought-relief committee, a circular entitled "Buy Health Protection With Your Food Money" was prepared in cooperation with the Extension Service, the Public Health Service, and the American Red Cross. This circular was distributed in mimeographed form by the Extension Service. The material, rearranged and partly revised, was later issued jointly by the Extension Service and this bureau under the title "Adequate Diets for Families With Limited Incomes." The information in this publication has been put in brief popular form in a leaflet issued by the department on The Family's Food at Low Cost, in a publication for teachers issued by the Office of Education, and in a leaflet for housewives on pellagra protection, issued by the Extension Service. In order to reach a still larger group of housewives, a weekly news release entitled "The Market Basket," has been issued by the press service since January, giving practical suggestions on food selection and on current food prices. This new series was started at the request of the woman's division of the President's Emergency Committee for Employment.

At the request of the same agency, a survey was made of the budgets in current use by social agencies, department stores, savings banks, and college departments for city families, and the preparation of a popular bulletin on family budgets was started. A similar survey was made of budgets for farm families, at the request of the White House Conference on Child Health and Protection, and the provisions for children in these budgets were analyzed for a report of this conference. This work on family budgets will be continued during the coming year in cooperation with the National Conference of Social Work, in order to provide practical material for use by welfare agencies engaged in aiding city and rural families.

In cooperation with the extension group in the American Home Economics Association, forms are being devised and tested for a household account book adapted to the needs of farm families. It is hoped that this book will be used by extension workers in many States, thus serving the double purpose of assisting individual housewives in the management of the family finances and of providing comparable information on family expenditures for use by research workers.

A new line of studies has been started during the year on the economical purchasing of low-cost dietaries. Using the suggested dietaries prepared for families of limited incomes, the important food materials are being priced at various types of stores and in various localities, to determine the variations in the price of each food with the quality, variety, form, and quantity bought. From this information detailed suggestions will be prepared indicating the most economical methods of buying the food and the price at which its purchase is justified in view of its comparative nutritive value.

HOUSEKEEPING EFFICIENCY STUDIES

The investigation as to work done in various types of households has been continued. The study of urban households in which the home makers are college graduates has been extended to include records from small towns and to increase the size of the sample from large cities. Tabulations have been made covering the first 400 urban records received, as well as the 929 rural records obtained earlier, on the time spent by the housewives themselves in various kinds of work and leisure, on the help in home making given by members of the family and paid workers, and on the extent to which baking and laundering are done outside the home. These results have been used in the preparation of committee reports for the White House Conference on Child Health and Protection and for the President's Conference on Home Building and Home Ownership. The full reports for both the rural and urban studies will be completed during the coming year.

TEXTILES AND CLOTHING

Early last year the Director of Scientific Work appointed a committee to survey the textile work of the department and to formulate recommendations for its development. In line with those recommendations, increased emphasis has been given to cooperative projects with those bureaus of the department dealing with textile production.

FABRIC COMPOSITION

The studies in fabric composition this year, continuing projects previously undertaken, have dealt with the wearing qualities of household materials manufactured from different grades of cotton, wool, and flax. A study of karakul fur is being planned.

In the cotton studies are utilized sheets manufactured from three different grades of raw cotton. The sheets are in constant use in a Washington (D. C.) hotel, where they are inspected daily by a member of the bureau staff. The first sign of breakage in any sheet made of Good Ordinary cotton occurred after it had been washed 102 times; the first breakage in any sheet of Strict Good Middling cotton appeared after 123 washings, and in those of Middling cotton after 137 washings. The type of break and its location on each sheet are recorded; then the sheet is repaired and returned to service. This study is being carried on in cooperation with the Bureau of Agricultural Economics.

As a part of a larger investigation of the influence of various production factors on the manufacturing properties of wool, the bureau is cooperating with the Bureau of Animal Industry in a study of the relative merits of blankets composed of different kinds of wool produced under the direction of the Bureau of Animal Industry at the United States Sheep Experiment Station at DuBois, Idaho. The blankets are being subjected to actual wearing conditions at the veterans' hospital in Washington, D. C., and a general hospital in Boston, Mass., and laboratory tests are being conducted to measure the properties important to the users of wool fabrics. The textile equipment necessary for the laboratory tests has been installed, and the methods to be used have been perfected during the past year. A study is also being made of the chemical changes taking place in the wool during wear and laundering.

In order to determine the possibilities of investigating the wearing qualities of fabrics containing various grades of flax, a preliminary study is being made of table linen in constant use. This, also, has been possible through the cooperation of a Washington hotel.

Work on karakul fur is being planned in cooperation with the Bureaus of Biological Survey and Animal Industry, as part of a project to determine the economic importance of breeding the karakul sheep in this country. The various physical properties, such as gloss, thickness, and durability, will be studied as an index of the usefulness of the fur.

The temporary change in quarters of the bureau during the year made necessary the installation of a controlled-humidity room for temporary use in connection with the studies of fabric composition, and the experience thus obtained has been capitalized to answer many inquiries from home-economics departments in colleges and universities where controlled-humidity rooms are being contemplated for textile research. An article describing the installation here was prepared and published in a home-economics journal, and a bibliography of references dealing with methods of the physical and chemical testing of textiles is also in preparation for the use of such departments where library facilities are not yet developed in this direction.

TEXTILE MAINTENANCE

IRONING STUDIES

The study of the effect of ironing temperatures and pressures upon the tendering of cotton fabrics has been continued, with experiments directed particularly to the removal of size, measure of the scorching tendency, and chemical damage. A series of experiments has been started in order to develop a reliable method that will completely desize cotton fabrics without tendering the cellulose. In general, it has been found that the methods used to remove the sizing materials most completely also tender the fabrics to the greatest extent. Our preliminary experiments indicate, however, that enzyme preparations can advantageously be used for this purpose. Tensile-strength values were found to be no lower for fabrics thus treated than for those which had been given one washing under controlled conditions.

The degree of scorch is determined by changes in the reflection of light of known wave lengths. With samples ironed at various known temperatures, tests made upon a very good grade of sheeting show a greater scorching tendency during the last part of its period of service even though the thickness has not been appreciably changed. Results also indicate that under the same ironing conditions, a greater scorching occurs on the fabrics that have received only the number of rinsings usual in home laundering than for those more thoroughly rinsed. These points are being studied further. It is planned to study also the influence of certain home-washing procedures upon the tendering of cloth during ironing.

The amount of chemical damage produced by various ironing temperatures and pressures upon a number of materials has been measured by means of viscosity and copper-number determinations. A special modification of Hagglund's method of copper-number determination has been developed in the bureau which has proved particularly satisfactory for estimating damage in unbleached cotton fabrics, on which viscosity measurements can not be made. Some work has been done on the changes occurring in the methylene blue absorption of cotton cellulose tendered by heat. A qualitative method for the rapid detection of very slight degrees of oxidation in cotton textiles has been selected and modified. Photomicrographs of cotton fabrics treated with methylene blue have shown that when a cotton material is ironed at scorching temperatures, the top protruding fibers are oxidized to a surprising degree as compared with the mass of the fabric.

SIZING STUDIES

The evaluation of different types of sizing and finishing mixtures used in the laundering process has been continued along the lines previously set up.

The properties of these starches have been studied and the data incorporated in a technical bulletin entitled "Some Physical Properties of Starch Pastes which Affect Their Stiffening Power on Fabrics," which has been submitted for publication. These results show that the stiffness of a sized fabric depends on the penetrating and coating powers of starch pastes, and these factors in turn depend in a general way on the consistency or viscosity of the pastes. The findings indicate also that the size of the swollen starch granules bears a definite relation to the penetrating and coating powers of the starch pastes. Work in defining and measuring the pliability of a sized fabric is now under way.

A poster showing methods and materials used in removing stains from fabrics was prepared in cooperation with the Office of Cooperative Extension. This chart, which was devised to stress the importance of the proper manipulation of the stain remover, is useful to both school and extension groups. The need for information on this subject is evident from the wide circulation of the Farmers' Bulletin entitled "Stain Removal from Fabrics: Home Methods." This bulletin is being enlarged at the present time to include additional instructions.

TEXTILE UTILIZATION

The work on textile utilization consists of experimental study to determine new and more satisfactory uses for fibers grown in the United States, and through popular publications to demonstrate these uses to the home makers of the country.

HOUSEHOLD TEXTILES

The making of hooked rugs, which has reached considerable proportions as a home industry, has become part of the home economics extension teaching in many States. Therefore, in cooperation with the Bureau of Agricultural Economics, a project was initiated this year for the purpose of developing a new cotton fabric which would be a suitable foundation material for all types of fillers used in hooked-rug making. Burlap has been chiefly used as a foundation, but as a result of this bureau's experimental work a cotton material has been developed which will take all kinds of fillers, is easy to handle in the frame, and easy to work with when stamping the design. It utilizes a short-staple cotton, is more durable, and can be manufactured at a sufficiently low cost to compete with burlap, thus providing another outlet for cotton.

Sample lengths of this new cloth are being sent to extension specialists in the States, who are asked to make further tests of the material, and efforts are being made to interest mills in its production.

A popular leaflet, which is in preparation, will stress the use of cotton foundation materials for hooked rugs, choice of pleasing colors, good patterns, and methods of making designs.

Farmers' Bulletin 1633, entitled "Window Curtaining," issued during the past year, describes and illustrates recommended uses of cotton materials for window draperies. Leaflet 76, Slip Covers, offers suggestions for improving the appearance of worn furniture and at the same time suggests the utilization of cotton.

Another leaflet, entitled "Livable Living Rooms," has been submitted for publication. It is the first of a series of house furnishing leaflets prepared in response to a request from the Office of Cooperative Extension, which is placing particular emphasis at this time on inexpensive home improvement as a means of creating more satisfying home living conditions.

The lantern slide, First Aid in Window Curtaining, which was revised, will soon be ready for distribution again under the title "Aids in Window Curtaining." A lantern-slide set is in preparation to supplement the leaflet on living rooms, and two posters have been prepared for distribution among field workers in extension service, illustrating and supplementing the bulletin on window curtaining and slip covers. Material was supplied to the building and housing division of the Bureau of Standards for exhibit purposes.

CHILDREN'S CLOTHING

The work on children's clothing has been continued. The bureau's effort here is to develop designs that allow maximum activity, comfort, and convenience, ease of adjustment, construction, and laundering, and also, by collaboration with manufacturers, to find and utilize

new cotton and wool materials which are especially suited to children's clothing. Cooperation has been effected with maternity centers, hospitals, nursery schools, child-welfare organizations, and individual mothers, to aid in testing the results of the experimental work in this field.

Three exhibits showing garments constructed according to these designs are now being sent throughout the United States in answer to requests for them. To date they have been loaned to 90 groups, including nursery schools, colleges, universities, extension meetings, medical and nurse associations, parent education groups, and meetings of manufacturers of children's wear, retailers, and sales people. Two manufacturers of notions are using some of the bureau's designs on which to demonstrate the use of their products, and commercial patterns for 13 of the designs originated here have been put on the market by four different pattern manufacturers. At present three manufacturers of ready-to-wear clothing are considering some of the designs for production.

This year new designs for little girls' dresses have been developed, and the results published in a leaflet, while new rompers for creeping babies and toddlers have been devised, and a leaflet describing them is now in press. A revision of the leaflet on winter play suits, which will contain new designs for both play suits and headwear suitable for cold and inclement weather, is almost complete.

A study of infants' wear is now under way. New designs for dresses and slips which will be comfortable and decrease the handling of the young baby during dressing have been developed as a result of consultations with child specialists, nurses, and mothers. The suggested designs will be tested in various institutions and individual homes.

A film strip showing recommended designs for boys' suits, girls' dresses, winter play suits, headwear, sun suits, and rompers for creeping babies is in preparation for distribution by the office of cooperative extension work.

Two members of the bureau staff were members of the subcommittee on children's clothing of the White House Conference on Child Welfare and Development, and bibliographical material and photographs were supplied by the bureau for the use of this committee.

REFERENCE SERVICE

The reference and abstract service of the division has been maintained and, as measured by the requests which have come for reference lists, it is meeting a recognized need in home economics departments. Bibliography No. 6, a selected list of scientific periodicals publishing the results of textile research, intended as a guide to those research institutions interested in building up a textile library, has been prepared in mimeographed form.

BUSINESS OFFICE

A reorganization, under the direction of the head of the business office, has considerably facilitated the business operations of the bureau. Beginning with the last fiscal year the bureau took over its own accounts, which were formerly handled in the office of the Sec-

rectary. A representative from the Comptroller General's office assisted in the setting up of an accounting system, which has worked smoothly and has enabled the division chiefs to keep closely in touch with their own expenditures. The bureau files have been centralized under the business office, and plans have been worked out for handling general correspondence under this same unit.

LIBRARY

The efficient management of the library has contributed largely to the work of the specialists of the bureau. The library staff has prepared several lists of references specially needed for correspondence and the research activities of the bureau. Special assistance was given in the checking and editing of a bibliography on the family, prepared as a part of the work of the committee on the family and parent education, of the White House Conference on Child Health and Protection.

INFORMATION SERVICE

The extent to which the research work of the bureau is functioning is forcibly shown by the increasing demands upon the information service. Individuals and groups, home makers, writers, professional workers, and commercial interests swell the volume of correspondence annually. This year the number of letters handled was 37,420, a surprising total in contrast with 20,000 of the preceding year. In addition to sales by the Superintendent of Documents, 2,865,575 copies of our publications were distributed free on request.

As in previous years the material published was prepared to meet both the technical and the popular demand. This year in response to the emergency caused by the drought and unemployment, three special publications on low-cost diets were prepared, two in co-operation with the Extension Service and one with the Extension Service and the American Red Cross. These publications are included in the following 11, which are either printed or in press:

Proximate Composition of Fresh Vegetables. Circular 146.
 Food for Children. Farmers' Bulletin 1674. (In press.)
 Slip Covers. Leaflet 76.
 Rompers. Leaflet 79. (In press.)
 Dresses for Little Girls. Leaflet 80.
 Cooking Cured Pork. Leaflet 81.
 The Family's Food at Low Cost. (Unnumbered.)
 Emergency Low-Cost Food Supply which will Help Prevent Pellagra. (Unnumbered.)

Adequate Diets for Families with Limited Incomes. Miscellaneous Publication 113.

Aunt Sammy's Radio Recipes Revised. (Unnumbered.)

Child-feeding charts. Series of eight, 16 by 20 inches in size.

The following manuscripts have been submitted for publication:

Some Physical Properties of Starch Pastes Which Affect Their Stiffening Power on Fabrics. Technical Bulletin.

The Vitamin A, B, C, and G Content of Thompson Seedless (Sultanina) and Malaga (*Vitis vinifera*) Grapes and Two Brands of Commercial Grape Juice (*V. vinifera* and *V. labrusca*). Article for Journal of Agricultural Research.

Midday Meals For Groups of Preschool Children in Day Nurseries and Nursery Schools. Circular.

The Iron Content of Vegetables and Fruits. Circular.

Summary of Data from Canning Investigations of the Office and the Bureau of Home Economics, United States Department of Agriculture. Circular.

How to Cook Rice. Leaflet.

Eleven articles were contributed to the 1931 Yearbook of Agriculture, reporting the results of special projects in each of the three divisions of the bureau, as follows:

Child-Welfare Studies Important in Work of Home Economics Bureau.

Clothing Costs Among 1,425 Farm Families Reported in Survey.

Cooking Time Varies With Style in Which Beef Roasts are Cut.

Cottonseed Flour Rich in Vitamin G, Experiments Show.

Fabrics for Children's Play Suits Tested for Resistance to Weather.

Food Composition Tables Revised to Meet Demand for More Adequate Data.

Meat Keeping in Home Refrigerators Studied in Varying Conditions.

Oven Canning Tests Show Factors Governing Heat-Penetration Rates.

Standard Specifications for Household Buying are Being Developed.

Textile Buying for the Home Would be Aided by System of Labeling.

Watermelons Prove Valuable Source of Vitamins A and C.

An unusual amount of effort and time has been given to press material this year in response to the need of the woman's division of the President's Emergency Committee for Employment. A mimeographed release of five pages called The Market Basket was sent weekly to 7,631 addresses, mainly newspapers, during the last 25 weeks of the fiscal year. The preparation of this material entailed the development each week of special low-cost recipes in our experimental kitchens. The usual press material, totaling about 300 articles and many special news stories, has been prepared, and in a number of cases special photographs have been made to illustrate articles or for use as separate news pictures. Subject matter and illustrative material have been supplied to magazine and newspaper writers in an increasing measure.

A reference list entitled "The Homemaker's Own Library" was prepared by a member of the bureau's staff at the request of Better Homes in America, for publication by that organization. This list brings together books that supplement each other in subject matter, making as a whole a well-rounded reference shelf on problems of the home and of family relationships.

A motion-picture film, Food Makes a Difference, was completed on October 24, and five copies were ordered by the bureau for distribution by the office of motion pictures. Since January, when the film was announced for routing, it has been shipped to 46 different addresses in various sections of the United States, where it has been shown to more than 12,000 persons, for the most part at rural meetings.

The two types of radio work carried on cooperatively with the department radio service have continued. For the "Aunt Sammy" Housekeepers' Chats, mailed out five times a week to 164 stations, 156 menus have been prepared, special recipes developed, the content of programs approved, and in many cases subject matter suggested. As a result of these programs thousands of requests are received from home makers each week for answers to household questions and for recipes and menus. As an aid in answering some of these requests the radio cookbook was revised and enlarged, and published as Aunt Sammy's Radio Recipes Revised. In the short time elapsing between the exhausting of the old edition and the printing of the new

one, 8,650 requests accumulated and 13,899 copies of the new cook book were sent the first two weeks after it came off the press.

Forty-five household calendar programs of the bureau were broadcast from Washington as a part of the National Farm and Home Hour over a network of 43 stations. Six special speakers, representing the White House Conference on Child Health and Protection, the National Council for Parental Education, and the American Home Economics Association, were invited to broadcast over this network in October and November, and eight programs in May, presented by special speakers on child development, centered about White House Conference findings.

A number of exhibits for national and international groups were prepared during the year. During August and September two exhibits were placed in the patio of the Administration Building for the Inter-American Conference and the meeting of the agricultural college editors. Special wax models featuring lamb, the center of a balanced meal, were made for the International Livestock Exposition in Chicago in November.

An exhibit with seven features representing work of the bureau was placed in the foyer of a Washington theater for one week in December. Three traveling exhibits of children's garments having special hygienic and self-help features have been sent in response to approximately 90 requests from various parts of the United States. An exhibit of children's play suits was sent to the Netherlands on request for parent education purposes. Three wax-model exhibits of a dinner for a 4-year-old, with equipment to encourage independence in eating habits, have been displayed a number of times. A selection of bulletins and charts went to Egypt as a permanent museum exhibit. Publications and special exhibit material were sent to the annual conference of the American Association of University Women held in Boston, to the National Congress of Parents and Teachers in Hot Springs, Ark., and to the American Home Economics Association in Detroit. Open house was held in our laboratories for the home economics section of the Land Grant College Association, the National Council of Parent Education, and delegates to the White House Conference on Child Health and Protection, all of which met in Washington in November, and for the conference of the National League for Women Voters in April. Special exhibits and open house were arranged for the public of Washington on May 1, child-health day.

